SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1258.—Vol. XXIX.] LONDON, SATURDAY, OCTOBER 1, 1859. [WITH JOURNAL] STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

THE CRAIGTON MINES COMPANY (LIMITED.)

Capital £10,000, in 10,000 shares of £1 each: 10s. on application, the rest in calls as required; with power to increase the capital to £20,000.

DIRECTORS.

GEORGE BROCKELBANK, Esq., 71, Lombard-street, London.
Mr. HARRISON IVINSON, Caldbeck, Cumberland.
HENRY GEORGE NEWBON, Esq., Elms House, Hammersmith.
CHARLES HENRY PARROTT, Esq., Circus, Greenwich.
JOSEPH PROCTER, Esq., 5, Finchley New-road, St. John's Wood, London.

MANAGING AGENT—Capt. Wm. Jeffrey, Caldbeck.
AUDITOR—Edmund Harding, Esq., 1, Basinghall-street, Public Accountant.
SOLICITOR—James B. Dill, Esq., Newton Stewart.
BANKERS—City District Banking Company, Carlisle.
" National Bank of Scotland, Newton Stewart.
" Messrs. Glyn and Co., Lombard-street, London.
SECRETARY—Mr. J. Burall Reynolds.

REGISTERED OFFICE.

No. 1, WINCHESTER HOUSE, OLD BROAD STREET, LONDON.

The Craigton Mines are situate near Newton Stewart, Scotland, and consist of grounds in the Barony of Heron, comprehending the lands and farms of Craigton, Path, Daltamnay, Stranord, and Little Park, that part of Larg to the south of the Kirrouchtree Saw Mills, part of the Deer Park, and the farm of Kirkland—all lying in the parish of Minnigaff and Stewartry of Kirkcudbright.

The proprietors have been two years exploring the mines, and have now obtained a lease of them for 21 years, from Martinmas Day, 1858, from the Lord of the Manor, at a royalty of 1-15th.

Machinery of all kinds has been erected suitable for lead washing—such as crushing-mill, stamping-mill, buddles, frames, &c.—all in first-rate order, and capable of washing 100 tons a month.

The Articles of Association have been signed and registered under the Joint-stock Companies Acts, by which the liability of the shareholders is limited to the payment of £1 per share.

The following are the reports from George Henwood, Esq., of London, and Capt. Stephen Eddy, of Carleton Grange, Skipton, addressed to the directors:—

London, May 27.—This mine is situated on one of the great champion lodes or mineral veins frequently found traversing the Cumbrian slates. In this instance the vein is unusually wide, and highly charged with mineral. It can easily be traced at the surface for miles. The lode is very well defined, the walls being perfectly smooth, and characteristic of an important metallic deposit; the course of it is slightly affected by the undulations of the mountainous district, and as the mine lies midway between granite ranges it cannot be situated in a more favourable geological position. It also possesses veins of metamorphic and trappean rocks, which are equivalents to the elvans seen in Cornish mines, and there so highly prized by the miners. At the intersections of these with the bearing parts of the great lode vast deposits of lead, copper, and zinc ores have been discovered and extracted. I had an opportunity of making an elaborate examination of the adjoining mines on the east, which are wrought on the same vein, where the most extensive works had been and still are carried out. At the East Black Craig, a recent spirited outlay has been rewarded by an immensely productive and valuable mine. From my observations, and from analagous reasoning, I am quite convinced in my own mind the richest deposits of lead and copper ores are still unwrought in the bottom levels. In the mine which is the subject of this paper the vast excavations afford ample evidence of its former prodigious productiveness, and from the peculiar characteristics of the vein itself, from the rich nature of the exudations in the various parts of the abandoned works, I feel morally certain like treatment would be attended with results similar to the eastern mine, but in a much higher degree, the lode, if possible, in the western mine showing stronger indications for mineral wealth. And I am further most decidedly of opinion that vigorous exertions in the adit level will shortly take the mine as rich as ever it has been at that depth, the end being driven towards and approaching a point at which, if similar appearances as precedent go for anything, an important change will be found, and the barren lode regain its position and productiveness. Another most important privilege this property possesses is that the ground is peculiarly free from water, and very small power sufficing to drain even the deepest parts yet reached. There are also extensive backs that may be wrought at an easy route. A splendid horse level has been driven, and rails and tramway laid for hundreds of fathoms, shafts sunk for ventilation, extensive and most perfect dressing apparatus driven by water power erected, the whole of which are situated in the most desirable situation for future operations: in short, I am bound in duty to say that it rarely falls to my lot to inspect a mine on which additional capital could be so well bestowed, and still more rarely one in which so brilliant a prospect of success can be had.

GEORGE HENWOOD, Mining Engineer.

Carleton Grange, Skipton, Sept. 12.—Acting upon the arrangement made with you, when I called at your office on the 23d of August last, I visited these mines on the 29th and 30th of that month, and having made a careful survey of the surface and underground workings, and now beg to hand you my report. You are, I presume, fully aware of the extent of your sett, and of its position with regard to the adjoining sett, now being worked by another company. In each of these properties there are extensive old workings, which are reported to have yielded considerable quantities of lead ore, and the results from subsequent operations are confirmatory of such reports. The principal vein from which such produce was obtained ranges about 25° north of west and south of east. In many parts this vein was found to be from 30 to 40 ft. wide; in such parts it might be said to have formed two veins. It is generally accompanied by a channel of rock, known by the miners and others in this locality as the blackstone. The presence of this blackstone, or trap rock, is considered indicative of riches in the vicinity, and the old works offer abundant proof of considerable produce in all parts where the blackstone formed one or both sides of the vein. The ancient workings appear to have been relieved from water by shallow adits; more recently the deeper works were drained to the depth of about 8 fms. from surface by a deep adit level driven northward from the foot of the hill, a distance of about 220 fms. to the vein, and extending about 160 fms. westward and a considerable distance eastward on the vein. In the adjoining ground the workings appear to have been prosecuted to a depth of about 50 fms. below the adit, but in the ground left by you they do not appear to exceed 26 fms., and that only for a short length. At present your operations are confined to preparatory works, and exploration at and above the adit level, and some trials at the surface. The principal work at the adit level has been the clearing and securing the level eastward from the cross-cut to the forebreast; the level appears to have been driven through productive ground for about 20 fms. from the cross cut; beyond this there are no symptoms of productiveness, but the vein looks promising for ore at many points. In a rise now being put up near the end of the level some good stones of copper and lead ore are occasionally met with, and here, as well as at the end of the level, the vein is composed of mineral of the most promising character. At present you can do but little in or over this level, in consequence of a deficiency of air, but a shaft is now being sunk from the surface to communicate with a rise put up over this level by the former company. By this means a communication will soon be effected, and a plentiful supply of air obtained. Eastward from the cross-cut you have only a few men employed on tribute. By surface trials in the western part of your sett the main vein has been discovered, and a sufficient distance driven on it at a shallow depth on what is called the Saw-pit shaft, to prove its bearing and general character. It is now time for the company to determine upon works of a more permanent character. There are two points where I think such works may be prosecuted with a great probability of success—one in the western and the other in the eastern part of the sett. The western trial should be by a good shaft sunk in the field lying southward of the saw-mill, and to sink the eastern trial should be made at Stranord's shaft, which is now down 22 fms. from surface. Water can be obtained here for a water-wheel, for pumping and winding. The shaft should be sunk to an additional 15 or 20 fms., and then levels extended east and west on the vein. The blackstone is proved to exist in the Cairnsmuir Mines, lying to the east, and in the East Black Craig, immediately to the west; and the lode having yielded considerable quantities of ore in each of these mines, I think there is every reason to suppose it will be found equally productive here. I would recommend the eastern sound for the first point of attack, as likely to be brought more rapidly into returns, and thus provide the means for opening out the western ground; in the meantime, the adit level westward should be pushed forward with all speed. The dressing-floors are well stocked with improved machinery and other appliances. The works altogether are well laid out for extensive operations, and with a due regard to economy. Looking at the result of previous workings, the extent of the sett, and the great length of unexplored ground on the range of the lodes, I consider the company to be in possession of a valuable property.

STEPHEN EDDY.

Applications for shares, accompanied by the payment of 10s. per share, can be made to the Bankers, or the Secretary of the Company.

FORM OF APPLICATION FOR SHARES.

To the Directors of the Craigton Mines Company (Limited).

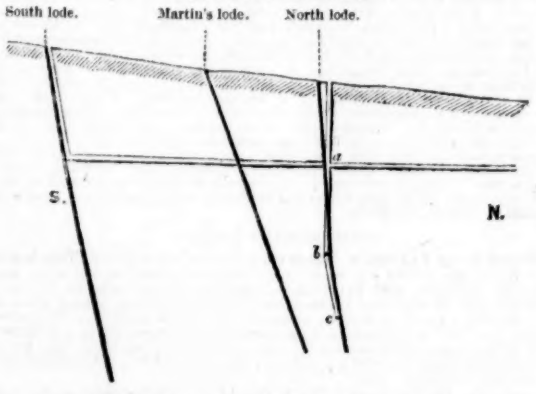
I request you to allot me shares in the above company, in respect of which I have this day deposited at the company's bankers, Messrs. the sum of , being 10s. on each share, and I accept such shares, or any lesser number that may be allotted to me, and hereby agree to sign when required the memorandum and Articles of Association of the company in respect thereof.

Name in full.....
Residence .....
Dated this day of 1859. Profession or business.....

GEOLOGICAL RAMBLES THROUGH THE MINING DISTRICTS OF SOUTH DEVON.—No. V.

The Great Central mining sett, in the parish of Ilsington, commences within half a mile to the north of Ashburton United boundary, and extends north for a mile and a half in length by about a mile in width. This extensive sett principally includes the ground worked a few years ago as Haytor Consols. The only workings of any importance over this tract are at three points—Hemsworthy Corner, situated on the north flank of Rippon Tor, in the granite, nearly a mile from the boundary of the killas; Crownly Works, situated in the granite near the junction of the killas, about a mile east from Hemsworthy Corner; and Smith's Wood, situated in the killas, about three-quarters of a mile south of Crownly, and nearly the same distance from the granite. The two former were worked by the Haytor Consols party, but the latter is a new discovery, on ground not included in the old grant. The lords of this sett are the Duke of Somerset and Lord Cranstoun. Hemsworthy Corner, the most extensive of these workings, is shown in the accompanying section:—

Transverse Section of Lodes at Hemsworthy Corner Engine-shaft.
(Scale, 20 fms. to an inch.)



a, adit and engine-shaft. *b*, 10 fm. level. *c*, 18 fm. level.

The adit shown in this section is driven south for a distance of 50 fms. to its intersection with the north lode at the engine-shaft, and is thence continued for another 30 fms. south to the south lode; it cuts the first lode in the engine-shaft at the depth of 10 fms., and the south lode at about 13 fms. deep. The engine-shaft is sunk 18 fms. below adit, the first 10 fms. perpendicular, and the other 8 fms. on the course of the lode, which, however, does not underlie much. Levels are driven at the 10 and the 18. In the last working this shaft was drained by one of Craddock's engines, which, whatever may be its merits where a rotary motion is required, was quite unfit for pumping purposes, and gave rise to endless annoyance and expense when used here.

The north lode was worked very extensively by the "ancients" from the surface to the depth of 10 or 12 fms., and no doubt some considerable quantity of tin was raised by them. The adit cross-cut was driven by the late party to come under the workings, and when the lode was intersected they extended this level east and west for about 85 fms. each way; but, as might have been expected, this was of little use, for they found that all the tin ground had been taken away to that depth. The company then proceeded to sink the engine-shaft. The first level was at the 10, which was extended 30 fms. east and 10 fms. west. From the back of this level a very fair quantity of tin was raised; this is stated in the prospectus at 1700*l.* or 1800*l.* worth, as to the correctness of which I shall by-and-bye refer. From the 10 they proceeded to sink to a 20 fm. level, but the position of affairs becoming unsatisfactory the shaft was not sunk below the 18, where a level was driven east and west 5 fms., each way through a tinny lode, but none of which has been taken away. Martin's lode, underlying 2 ft. in the fathom, and dipping towards the north lode, is not of much importance; it has been extended upon it at the adit about 5 fms. east and the same distance west. The south lode has also some ancient workings. The Haytor Consols party extended the adit 15 fms. east and 10 fms. west on this lode, which is stated to be promising, and from which some tin was raised. An air-shaft was opened from the surface to the adit a little east of the cross-cut, on the course of this lode, and was for some time used as a whim-shaft; it has now fallen together. The adit has also fallen together north of the engine-shaft, so that all the works at Hemsworthy Corner are under water. The bearing of these three lodes is, as near as possible, due east and west (magnetic).

Crownly Works were also explored by the "ancients" on the back of three lodes, high up on the side of the hill. The Haytor Consols Company drove two adits here lower down the hill, intending to come in under the workings on two of these lodes. One of these adits, called Cranstoun adit, has been driven 115 fms.; 20 fms. cross-cut, and 95 fms. on the course of the Cranstoun lode, from which a little tin was raised. Another adit was driven 90 fms. by the side of a north lode at a distance of about 6 or 8 fms. from it. A little below the mouth of this last adit the dressing-floors of the late company were laid out in a manner regardless of expense: 32 heads of stamps were erected, and a railway one mile and three-quarters in length was laid down between these floors and Hemsworthy Corner Mine.

These were the whole workings of the late Haytor Consols Company, which yet involved (it is said) an outlay and loss of between 12,000*l.* and 14,000*l.* As any miner will see from reading the description I have given, the mines were worked in a most unminer-like manner; large sums of money were squandered on railways, stamps, and surface works before any adequate ore ground had been laid open to justify such an outlay, and the underground works were conducted in a feeble and incompetent manner. That the result was a discreditable failure is not to be wondered at, and reflects in no degree on the mines themselves, which, without holding forth any very showy prospects, are yet worthy of a fair and miner-like trial. The main portion of the tin sold by this company was raised from the north lode at Hemsworthy, but *some* was raised on the south lode, and also from the back of the Cranstoun adit at Crownly. I can only find returns (as under) of the sale of 15 tons 15 cwts. 2 qrs. 11 lbs. of black tin, realising 965*l.* 12s. I cannot, therefore, understand how the 10 fm. level, on the north lode, alone could have returned 1700*l.* or 1800*l.* worth of tin, as stated in the prospectus, unless sales were made which are not in the published returns, which may have been the case.

1853	Tons 7 5 0 11	£504 2 2
1854	6 5 0 0	338 9 10
1855	2 5 2 0	123 0 0

In the autumn of last year these setts were again taken up by Mr. E. A. Ross and partners, with an extension of the ground south on Lord Cranstoun's land, so as to include Smith's Wood, and the concern was brought before the public under the high-sounding name of the "Great Central Mining Company of Devon." Why it should be called this name is not very clear, nor would it much matter, if the name did not seem to embody an incorrect statement made in the prospectus. In this it is stated that "the setts are centrically situated . . . between the two celebrated mining districts of Tavistock and Ashburton;" while, in fact, they adjoin the parish of Ashburton, but are nearly 14 miles from the Tavistock district. It would be as correct to say that the new Houses of Parliament are "centrically" situated between Westminster Abbey and Greenwich Hospital. The work done by this party is as follows:—At Crownly Works they have cleared up and secured the two long adits, and sunk a shaft 5 fms. deep on the Cranstoun lode, 60 fms. ahead of the end of Cranstoun adit, where there is a promising lode; and at Hemsworthy Corner a shaft has been sunk 10 fms. deep on the south lode, 7 fms. east of the old whim or air shaft, which has fallen together. But the most important work they have done is the opening out, in Smith's Wood, of Browning's tin lode.

Smith's Wood lies opposite Sigford Consols on the west, the valley between them running nearly due north and south (magnetic). In February last this part of the Great Central sett was costeaned for the purpose of discovering the Sigford copper lode, then considered to be promising. This lode was not found, but a tin lode, called Browning's lode, was laid open at the surface, of a most extraordinary character. It is fully 25 feet wide, producing almost throughout rich tin work; and, judging from the facts before us, it appears to be decidedly the best discovery made on the eastern side of Dartmoor since the discovery of Wheal Emma. The lode is running into a high hill, and is capable of making profits at the present moment, if there were any stamping power on the mine. The same lode has also been opened on higher up on the hill, where it is equally strong and large, but not tinny; its bearing seems to be about 45° south of east, it probably underlies north, but it has not been opened on sufficiently to judge either of those points with certainty. The lode, with a course of tin at the surface capable of being at once worked to a profit, would, of course, be of very considerable value, were it not for some considerations which suggest doubts. The first is the size of the lode, and the uncertainty as to whether any definite wall is even yet found; the second is its direction, which is too much south of east, as far as I can judge of the direction, according to the experience of the productive lodes of this county; and the last, but certainly not the least, is its situation in the Ashburton district, which is, unhappily, characterised generally by flattering surface indications, which are not borne out in performances. Yet, notwithstanding these doubts, the fact remains of a valuable course of tin in sight; and the experience of the old Beam Mine, in Ashburton United, shows us that this district, treacherous as it undoubtedly is in many cases, may in certain favourable cases produce really valuable courses of tin to the depth of 40 or 50 fathoms. I, therefore, by my remarks, do not wish to depreciate this discovery, but merely to suggest moderation and caution, which no one who regards the unredeemed succession of failures in this district for the last fifty years can believe to be unnecessary.

[All operations on this sett have been suspended for above three months, and the labour cost has remained unpaid for a longer period. Under ordinary circumstances I should not refer to a matter of this kind, but in this instance it happens to involve a case of hardship such as rarely occurs. Capt. James Browning, the captain of these mines, a most worthy and respectable man, has, in his zeal for the company, made himself liable for the labour cost, amounting to 170*l.*, besides advancing the whole of his savings on their account. After a considerable amount of forbearance on the part of the men, there being no prospect of payment, he has at last been summoned by them, and orders for payment have been obtained against him. The property on the mines has realised very little, and Capt. Browning has no means of paying the amount due. If it is not forthcoming in a few days, the limit of indulgence allowed by the law will have expired, and the result to Capt. Browning and his young family will be utterly disastrous. Leaving all business considerations out of the question, I appeal to those gentlemen whose names appear publicly in connection with this concern to come forward, in the name of honour and humanity, and relieve their agent from the position to which he has been reduced, from one of great comfort, by zeal for their service.]

The Ashburton United leat passes through Smith's Wood, by a grant from Lord Cranstoun, which is, however, terminable at six months' notice. When this part of the Great Central sett goes regularly to work, which will certainly be done by some party or another, there can be very little doubt but that the necessary notice will be given, and the water cut off.

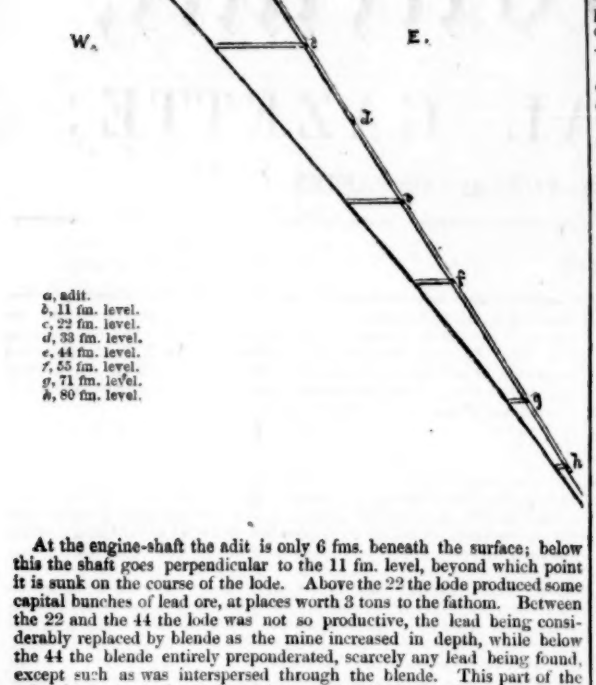
Sigford Consols is a small sett adjoining Smith's Wood on the east. A very pretty copper discovery was made at the surface here last year, but it has since been only slightly prosecuted. Greater importance seems recently to have been attached to Browning's tin lode, which, if it is a regular lode and continues, must come into this sett. The Sigford bottom has been extensively, but not very judiciously, costeaned in search of it. It is now supposed to be discovered; but as water is in the pit, it has not been possible yet to see it in sufficiently settled ground to definitely judge whether this is the case or not. A deeper stope is now being brought in, which will shortly settle the matter. If Browning's lode should be found to underlie south it would be of little value to this sett; but if, as seems to be the case, it dips north, it will lengthen in depth in the Sigford ground. Steam-power is at once necessary to prosecute this lode in this sett. Works have recently been resumed on the copper lode, which is reported to look well near surface, producing nice stones of copper.

South Sigford is a sett on the north bank of the Lemon, opposite East Ashburton sett; it contains lodes parallel to those of Ashburton United, which have been opened upon in costeaning, with promising appearances.

Silver Brook Lead Mine is situate quite near the village of Ilsington, at a distance of about one mile east of Crownly Works, and two miles north-east from Ashburton United. Like all lead lodes in the West, the bearing of the lode in this mine is nearly at right angles to that of the copper and tin lodes; its exact direction averaging north-east or south-west (magnetic), or about 20 deg. east of true north. The back of the lode was explored by the ancients in an adit level, above which, and in a sink 4 fathoms below it, they seem to have raised some quantity of lead. The modern working of this mine commenced about 1852, and terminated Oct.

1857, during which time it was sunk to the depth of 80 fms. below adit, as seen by the accompanying section.

Transverse Section of Lodes at Silver Brook Engine-Shaft.
(Scale, 20 fms. to an inch.)



a, adit.
b, 11 fm. level.
c, 22 fm. level.
d, 33 fm. level.
e, 44 fm. level.
f, 55 fm. level.
g, 71 fm. level.
h, 80 fm. level.

At the engine-shaft the adit is only 6 fms. beneath the surface; below this the shaft goes perpendicular to the 11 fm. level, beyond which point it is sunk on the course of the lode. Above the 22 the lode produced some capital bunches of lead ore, at places worth 3 tons to the fathom. Between the 22 and the 44 the lode was not so productive, the lead being considerably replaced by blende as the mine increased in depth, while below the 44 the blende entirely preponderated, scarcely any lead being found, except such as was interspersed through the blende. This part of the mine, however, produced very fair quantities of blende, the lode at some points giving 4 tons to the fathom.

In the section the western lode is seen to the west of the main lode. During the latter part of the workings the leading object was to sink the engine-shaft to the point of intersection of these two lodes, which it was expected would be about the depth of 75 fathoms; as, however, the western lode dipped more perpendicularly in depth, the junction did not occur at the expected point; and, after sinking to the 80, the patience of the shareholders was exhausted, and the mine ultimately abandoned within a few fathoms of the probable intersection.

The main lode in this mine, which underlies about 2½ feet in the fathom, and averages about 3 feet wide, is principally composed of carbonate of lime. Although fairly productive near the surface, it evidently fails in depth. The western lode, on the contrary, is of a flookany character, and very promising for depth, although unproductive upwards. As seen in the section, it has been cross-cut into in the 22, 44, 55, 71, and the 80. Besides sinking to the 80, the main lode was also fairly tried in length, particularly upwards, the following distances having been driven in the different levels:—In the adit north 16 fathoms, south 100 fathoms; in the 11 north 60 fathoms, south 80 fathoms; in the 22 north 103 fathoms, south 90 fathoms; in the 33 north 65 fathoms, south 70 fathoms; in the 44 north 80 fathoms, south 70 fathoms; in the 55 north 30 fathoms, south 30 fms.; in the 71 north 30 fathoms, south 30 fathoms; and in the 80 north 3 fms. No levels were extended on the western lode, except in the 22, where that lode was driven on a few fathoms south.

This mine was worked by two small engines—a 20-in. for pumping, which worked a 7-in. plunger-lift fixed in the 44, and a 6½-in. and 6¼-in. drawing-lift below that point; and a 10-in. rotary engine for drawing and crushing. These engines are still on the mine, but the pitwork has been drawn up, and the other plant sold. The ground in the mine was very speedy, the average price of driving being from 30s. to 35s. per fathom, and a lift was readily sunk in three months; on the other hand, the timbering at the shaft was very heavy and costly.

MINING PROSPECTS IN THE WEST OF IRELAND—No. VI.

A few miles north-east of the village of Goleen we arrive at a place called Ballyrizzard, the property of a Mr. Hungerford: this is the next point at which exploration has been made, if we except an attempt at raising gold quartz near Goleen, were a heap of that material, procured by Mr. St. Peirre Foley, still lies by the roadside. On this property partial and experimental trials have been made by the proprietor (a scientific gentleman) induced by the "greens," and appearances of the lodes and veins in the cliffs. In no case has the effort been unsuccessful; beautiful stones of yellow and purple ore have been procured, associated with gossan and quartz of a highly-promising character. No attempt at mining has, however, yet been made. That astute and accomplished geologist and mineralogist, F. Lisabé, has made and published an accurate survey of these lands, and plainly demonstrates these lodes to be of the great east and west series, comprising the celebrated mines before named. Who is to say they may not be equally successful? Berehaven did not always pay 35,000*l.* per year profit—Devon Great Consols were once out of the copper district.

On the western shore of the harbour of Schuyl, or Skull, stretches a piece of land, or promontory, forming the extreme southern slope, or base, of the huge range Mount Gabriel, attaining an altitude of nearly 3000 ft.; by the eye or dial it is easily perceived, the lodes constituting the series dwelt on in my former papers on this locality pass directly through it. No wonder that the able, but eccentric, Capt. William Martin should devote attention to this spot; numerous shode pits and trial shafts attest his presence and ability: in most of them copper ores of excellent quality have been met with, and in one or two instances in considerable quantities for the small depth attained. Circumstances perfectly irrespective of the mines' value, however, have hitherto prevented their being wrought. After making a careful examination of them, I feel that the day is not far distant when the excitement consequent on the success of neighbouring properties on the same run of lodes will cause this property to be exceedingly valuable, and much in request; it is of sufficient extent to constitute three large mining setts.

On the eastern shore of the Schuyl Bay is the once celebrated Coosheen Mine: if ever there was a property in mining unworthily treated surely it is here. Report says, and people in the locality believe the report, that the mine was wrought more for jobbing purposes than for mineral wealth, though of the latter above 20,000*l.* worth was procured from workings which in a mining district would be only termed surface scratching; the burrows and old works fully demonstrate the qualities and capabilities of these lodes if properly worked. The ores procured were chiefly purple and yellow ore, with malachite—massive, fibrous, and mammiliary, the colour and figure quite equal to Australian or Russian produce; yet this was ruthlessly consigned to the crusher without selection or choice. Perhaps malachite was not so much in demand as at present; it would now fetch a considerable sum for ornamental purposes. The large returns already mentioned are surely facts that hold out great hopes of the resuscitation of this mine, and of promise for all situated on the run of lodes. That all places in veins should be expected to be eminently productive, the experience of all mining localities, and even the history of all mines themselves, prove erroneous. I was assured by a most intelligent mine captain, who accompanied me over the ground, that the mine had never been half tried; that as long as it would pay its way, and a bit of ore was in sight, nothing would do but to raise it forthwith, without the slightest regard to forethought or discovery. On inspecting the plans and sections of the mine the fact was evident, and the fact that Coosheen will again be a rich mine was also palpable to the meanest capacity; to accomplish this end, however, an outlay must be submitted to, even though some considerably valuable works are executed, and a pretty little surface plant is on the mine.

On this mine, by a little attention to the lodes, as here decidely shown by the line of shafts on them, a tolerably correct idea of the direction and strike of the east and west veins, as well as the cross-courses, may be formed. It will be found that the former are precisely as indicated in former papers on this interesting subject; the latter can be traced, and their sinuosities, deviations, and number, seen remarkably well displayed in the sides and cliffs of the Mount Gabriel range. This place affords an excellent field for study; and I should advise students, geologists, or miners, to spend a day or two at Schuyl, where from mine host Roberts, himself a practical underground Cornishman, they will find every attention, obtain every information, and experience what an Irish hotel can and should be—comfortable and economical.

East of the Coosheen are some mines near Ballydehob, called Ballycumick, Kilmacoe, &c., working under proper supervision, and with adequate capital, I believe by the Mining Company of Ireland, but as my "leave of absence" was fast waning, I was reluctantly compelled to quit this intersting scene.

On my way to Dunmanway and Bantry by car, I noticed a great change in the strata, it becoming more adapted to lead production than anything I had before witnessed. As I made this observation to my fellow-traveller, the driver of one of those incomprehensible, uncomfortable, and inconvenient things, public cars, said, "Sure enough there once was lead here, but devil a bit is got now, and more is the shame." We soon passed a splendid lead gossan on the road side, and heaps of old burrows on the hill side, when I bethought me of the driver's remarks, and could not but acquiesce in the truth of the sentiment.

George Henwood.

THE WAR DEPARTMENT EXPERIMENTS ON IRON.

We have already devoted some considerable space to comments upon these important experiments; and, in accordance with our concluding remarks of last week, we subjoin the summary of the results obtained. The several districts are separated from each other, so that general conclusions may be drawn as to the relative value of the iron produced in them; whilst the precise results obtained with each iron and by each test will enable those most interested to acquire every information they can desire:—

NORTHERN DISTRICT.

Hematite Foundry, Whitehaven.—No. 1, Foundry Pig: The specific gravity was 7·097. In the tensile test the breaking weight was 14,233 lbs.; extension, ·011. In the transverse test the breaking weight was 4644 lbs.; deflection, ·161. In the torsion test the breaking weight was 3724* lbs.; angle of torsion, 7·2. The force required for crushing, 52,136 lbs.——No. 3, Foundry Pig: The specific gravity was 7·214. In the tensile test the breaking weight was 17,751* lbs.; extension, ·012. In the transverse test the breaking weight was 5105* lbs.; deflection, ·120. In the torsion test the breaking weight was 4182* lbs.; angle of torsion, 5·8. The force required for crushing, 82,265 lbs.——No. 4, Foundry Pig: The specific gravity was 7·196. In the tensile test the breaking weight was 17,566* lbs.; extension, ·012. In the transverse test the breaking weight was 6100* lbs.; deflection, ·152. In the torsion test the breaking weight was 4977* lbs.; angle of torsion, 4·9. The force required for crushing, 82,583 lbs.

Weardale Iron Company.—No. 1, Pig-iron: The specific gravity was 7·088. In the tensile test the breaking weight was 18,080 lbs.; extension, ·010. In the transverse test the breaking weight was 5600* lbs.; deflection, ·147. In the torsion test the breaking weight was 5510 lbs.; angle of torsion, 10·1. The force required for crushing, 59,771 lbs.——No. 3, Pig-iron: The specific gravity was 7·158. In the tensile test the breaking weight was 21,859* lbs.; extension, ·011. In the transverse test the breaking weight was 7374* lbs.; deflection, ·181. In the torsion test the breaking weight was 5968* lbs.; angle of torsion, 7·7. The force required for crushing, 90,046* lbs.——No. 4, Pig-iron: The specific gravity was 7·248. In the tensile test the breaking weight was 23,513* lbs.; extension, ·009. In the transverse test the breaking weight was 7672* lbs.; deflection, ·173. In the torsion test the breaking weight was 6350 lbs.; angle of torsion, 7·2. The force required for crushing, 109,286 lbs.——Remelted: The specific gravity was 7·180. In the tensile test the breaking weight was 30,333 lbs.; extension, ·012. In the transverse test the breaking weight was 8948 lbs.; deflection, ·191. In the torsion test the breaking weight was 6277* lbs.; angle of torsion, 5·2. The force required for crushing, 122,216 lbs.

NORTH MIDLAND DISTRICT.

South Bank Furnaces, Middlesbro'-on-Tees.—No. 2, Toughened Pig: The specific gravity was 7·089. In the tensile test the breaking weight was 18,425 lbs.; extension, ·008. In the transverse test the breaking weight was 6260 lbs.; deflection, ·110. In the torsion test the breaking weight was 6405 lbs.; angle of torsion, 5·7. The force required for crushing, 86,886 lbs.——No. 2, Foundry Pig: The specific gravity was 7·023. In the tensile test the breaking weight was 15,835 lbs.; extension, ·006. In the transverse test the breaking weight was 5563 lbs.; deflection, ·105. In the torsion test the breaking weight was 5626 lbs.; angle of torsion, 6·5. The force required for crushing, 77,926 lbs.

Stockton Iron-Works.—No. 1, Hot-blast: The specific gravity was 7·148. In the tensile test the breaking weight was 25,810 lbs.; extension, ·011. In the transverse test the breaking weight was 7159 lbs.; deflection, ·136. In the torsion test the breaking weight was 5872* lbs.; angle of torsion, 4·2. The force required for crushing, 99,524 lbs.——No. 3, Hot-blast: The specific gravity was 7·135. In the tensile test the breaking weight was 22,271 lbs.; extension, ·009. In the transverse test the breaking weight was 6932 lbs.; deflection, ·134. In the torsion test the breaking weight was 6305 lbs.; angle of torsion, 5·7. The force required for crushing, 87,063 lbs.

Butterley Iron-Works, Derbyshire.—No. 1, Foundry Pig: The specific gravity was 7·141. In the tensile test the breaking weight was 23,388 lbs.; extension, ·010. In the transverse test the breaking weight was 7106 lbs.; deflection, ·145. In the torsion test the breaking weight was 7342 lbs.; angle of torsion, 9·3. The force required for crushing, 88,488 lbs.——No. 2, Foundry Pig: The specific gravity was 7·078. In the tensile test the breaking weight was 18,970 lbs.; extension, ·010. In the transverse test the breaking weight was 6077 lbs.; deflection, ·128. In the torsion test the breaking weight was 6011 lbs.; angle of torsion, 7·5. The force required for crushing, 74,745 lbs.——No. 3, Foundry Pig: The specific gravity was 7·126. In the tensile test the breaking weight was 23,265 lbs.; extension, ·009. In the transverse test the breaking weight was 6692 lbs.; deflection, ·130. In the torsion test the breaking weight was 6940 lbs.; angle of torsion, 7·5. The force required for crushing, 91,661 lbs.——No. 3, Blue Rake: The specific gravity was 7·073. In the tensile test the breaking weight was 24,126* lbs.; extension, ·010. In the transverse test the breaking weight was 7364* lbs.; deflection, ·153. In the torsion test the breaking weight was 6371* lbs.; angle of torsion, 6·4. The force required for crushing, 97,041 lbs,

West Hallam Iron-Works, Ilkeston, Derbyshire.—No. 1, Melting Pig: The specific gravity was 7·121. In the tensile test the breaking weight was 22,107 lbs.; extension, ·012. In the transverse test the breaking weight was 7587 lbs.; deflection, ·153. In the torsion test the breaking weight was 7312 lbs.; angle of torsion, 8·1. The force required for crushing, 82,229* lbs.——No. 2, Melting Pig: The specific gravity was 7·217. In the tensile test the breaking weight was 29,840 lbs.; extension, ·014. In the transverse test the breaking weight was 9033 lbs.; deflection, ·172. In the torsion test the breaking weight was 8113* lbs.; angle of torsion, 8·0. The force required for crushing, 119,483 lbs.——No. 3, Melting Pig: The specific gravity was 7·239. In the tensile test the breaking weight was 30,115* lbs.; extension, ·013. In the transverse test the breaking weight was 9389 lbs.; deflection, ·157. In the torsion test the breaking weight was 7973* lbs.; angle of torsion, 8·6. The force required for crushing, 120,321 lbs.——Grey Forge: The specific gravity was 7·166. In the tensile test the breaking weight was 25,380 lbs.; extension, ·012. In the transverse test the breaking weight was 7751 lbs.; deflection, ·142. In the torsion test the breaking weight was 7714 lbs.; angle of torsion, 8·3. The force required for crushing, 99,193 lbs.——No. 4, Strong Forge: The specific gravity was 7·117. In the tensile test the breaking weight was 19,847 lbs.; extension, ·010. In the transverse test the breaking weight was 7173 lbs.; deflection, ·159. In the torsion test the breaking weight was 6403 lbs.; angle of torsion, 8·7. The force required for crushing, 75,318 lbs.

NORTH STAFFORDSHIRE DISTRICT.

Goldendale Iron-Works.—Pig-iron: The specific gravity was 7·096. In the tensile test the breaking weight was 25,430 lbs.; extension, ·008. In the transverse test the breaking weight was 7591 lbs.; deflection, ·152. In the torsion test the breaking weight was 6837 lbs.; angle of torsion, 4·5. The force required for crushing, 113,459 lbs.

SOUTH STAFFORDSHIRE DISTICT.

Netherton Iron-Works, near Dudley.—No. 1, Melting Foundry Pig-iron: The specific gravity was 7·125. In the tensile test the breaking weight was 20,517 lbs.; extension, ·010. In the transverse test the breaking weight was 6954* lbs.; deflection, ·166. In the torsion test the breaking weight was 6130 lbs.; angle of torsion, 14·4. The force required for crushing, 75,977 lbs.——No. 2, Melting Foundry Pig-iron: The specific gravity was 7·175. In the tensile test the breaking weight was 26,012 lbs.; extension, ·011. In the transverse test the breaking weight was 8139 lbs.; deflection, ·196. In the torsion test the breaking weight was 7186 lbs.; angle of torsion, 14·9. The force required for crushing, 85,473 lbs.——No. 3, Grey Forge: The specific gravity was 7·161. In the tensile test the breaking weight was 24,222 lbs.; extension, ·012. In the transverse test the breaking weight was 7634 lbs.; deflection, ·177. In the torsion test the breaking weight was 6204 lbs.; angle of torsion, 14·5. The force required for crushing, 82,466 lbs.——Nos. 4 and 5, Forge: The specific gravity was 7·217. In the tensile test the breaking weight was 30,344 lbs.; extension, ·014. In the transverse test the breaking weight was 9619 lbs.; deflection, ·200. In the torsion test the breaking weight was 7570 lbs.; angle of torsion, 14·1. The force required for crushing, 108,285 lbs.——No. 5, Strong Forge: In the transverse test the breaking weight was 8129 lbs.; deflection, ·123.

Park Head Furnaces, Dudley.—Foundry Melting Pig: The specific gravity was 7·195. In the tensile test the breaking weight was 27,033 lbs.; extension, ·011. In the transverse test the breaking weight was 7778* lbs.; deflection, ·168. In the torsion test the breaking weight was 7226* lbs.; angle of torsion, 16·2. The force required for crushing, 95,787 lbs.——Grey Forge: The specific gravity was 7·082. In the tensile test the breaking weight was 18,831 lbs.; extension, ·010. In the transverse test the breaking weight was 5998 lbs.; deflection, ·144. In the torsion test the breaking weight was 5969 lbs.; angle of torsion, 10·6. The force required for crushing, 69,733 lbs.——Forge: The specific gravity was 7·192. In the tensile test the breaking weight was 30,554 lbs.; extension, ·013. In the transverse test the breaking weight was 8840* lbs.; deflection, ·183. In the torsion test the breaking weight was 7697* lbs.; angle of torsion, 11·7. The force required for crushing, 107,223 lbs.

Old Hill Furnaces, near Dudley.—No. 2, Foundry Pig: The specific gravity was 6·949. In the tensile test the breaking weight was 14,597 lbs.; extension, ·009. In the transverse test the breaking weight was 5192* lbs.; deflection, ·133. In the torsion test the breaking weight was 4642* lbs.; angle of torsion, 10·1. The force required for crushing, 80,499 lbs.——No. 3, Grey Forge: The specific gravity was 7·111. In the tensile test the breaking weight was 23,815 lbs.; extension, ·011. In the transverse test the breaking weight was 7478 lbs.; deflection, ·167. In the torsion test the breaking weight was 7147 lbs.; angle of torsion, 13·5. The force required for crushing, 80,991 lbs.——No. 4, Forge: The specific gravity was 7·058. In the tensile test the breaking weight was 22,918* lbs.; extension, ·012. In the transverse test the breaking weight was 6926 lbs.; deflection, ·157. In the torsion test the breaking weight was 5757* lbs.; angle of torsion, 8·3. The force required for crushing, 80,213 lbs.——Strong Forge: The specific gravity was 7·143. In the tensile test the breaking weight was 27,676* lbs.; extension, ·011. In the transverse test the breaking weight was 7793* lbs.; deflection, ·153. In the torsion test the breaking weight was 8861* lbs.; angle of torsion, 6·1. The force required for crushing, 119,807 lbs.

Lays Iron-Works, near Dudley.—Hematite Iron, First Melting: The specific gravity was 7·253. In the tensile test the breaking weight was 31,480* lbs.; extension, ·012. In the transverse test the breaking weight was 8142* lbs.; deflection, ·171. In the torsion test the breaking weight was 5071* lbs.; angle of torsion, 5·1. The force required for crushing, 119,631 lbs.

Level Iron-Works, Brierley Hill.—Hot-blast Pig-iron: The specific gravity was 7·143. In the tensile test the breaking weight was 26,198 lbs.; extension, ·013. In the transverse test the breaking weight was 7254* lbs.; deflection, ·145. In the torsion test the breaking weight was 5879* lbs.; angle of torsion, 5·7. The force required for crushing, 99,795 lbs.——Cold-blast Pig-iron: The specific gravity was 7·052. In the tensile test the breaking weight was 25,872 lbs.; extension, ·013. In the transverse test the breaking weight was 6903* lbs.; deflection, ·129. In the torsion test the breaking weight was 5654* lbs.; angle of torsion, 6·2. The force required for crushing, 86,650* lbs.

NORTHAMPTONSHIRE DISTRICT.

East End Works, Wellingborough.—No. 1, Grey Foundry Pig: The specific gravity was 7·185. In the tensile test the breaking weight was 26,105 lbs.; extension, ·008. In the transverse test the breaking weight was 5744 lbs.; deflection, ·107. In the torsion test the breaking weight was 5424* lbs.; angle of torsion, 3·4. The force required for crushing, 105,395 lbs.——No. 2, Mottled Iron: In the transverse test the breaking weight was 4869 lbs.; deflection, ·082.

Heyford Iron-Works, near Weedon.—Pig-iron, First Melting: The specific gravity was 6·886. In the tensile test the breaking weight was 10,866 lbs.; extension, ·002. In the transverse test the breaking weight was 3075 lbs.; deflection, ·082. In the torsion test the breaking weight was 3905 lbs.; angle of torsion, 1·9. The force required for crushing, 77,690 lbs.

FOREST OF DEAN DISTRICT.

Park End Furnaces, Gloucestershire.—Foundry Pig: The specific gravity was 7·115. In the tensile test the breaking weight was 12,593 lbs.; extension, ·009. In the transverse test the breaking weight was 5220 lbs.; deflection, ·180. In the torsion test the breaking weight was 4478 lbs.; angle of torsion, 11·5. The force required for crushing, 56,116 lbs.——Grey Forge: The specific gravity was 7·176. In the tensile test the breaking weight was 17,019 lbs.; extension, ·009. In the transverse test the breaking weight was 6781 lbs.; deflection, ·167. In the torsion test the breaking weight was 6232 lbs.; angle of torsion, 10·5. The force required for crushing, 73,409 lbs.

SOUTH WALES DISTRICT.

Ystalyfera Iron-Works, Glamorganshire.—Anthracite, Second Melting.—No. 1, Foundry Pig: The specific gravity was 7·165. In the tensile test the breaking weight was 25,172* lbs.; extension, ·011. In the transverse test the breaking was 7848* lbs.; deflection, ·163. In the torsion test the breaking weight was 6704* lbs.; angle of torsion, 12·2. The force required for breaking was 87,475* lbs.——No. 2, Foundry Pig: The specific gravity was 7·157. In the tensile test the breaking weight was 26,758* lbs.; extension, ·013. In the transverse test the breaking weight was 7944* lbs.; deflection, ·196. In the torsion test the breaking weight was 6176* lbs.; angle of torsion, 9·6. The force required for crushing, 90,894 lbs.——No. 3, Foundry Pig: The specific gravity was 7·150. In the tensile test the breaking weight was 24,533 lbs.; extension, ·012. In the transverse test the breaking weight was 7228* lbs.; deflection, ·166. In the torsion test the 5719* lbs.; angle of torsion, 8·8. The force required for crushing, 88,772 lbs.——Anthracite, First Melting.—No. 1, Foundry Pig: The specific gravity was 7·102. In the tensile test the breaking weight was 25,311* lbs.; extension, ·013. In the transverse test the breaking weight was 7656* lbs.; deflection, ·174. In the torsion test the breaking weight was 6265* lbs.; angle of torsion, 12·4. The force required for crushing, 97,570.—— No. 2, Foundry Pig: The specific gravity was 7·132. In the tensile test the breaking weight was 21,661 lbs.; extension, ·012. In the transverse test the breaking weight was 7206* lbs.; deflection, ·175. In the torsion test the breaking weight was 6559* lbs.; angle of torsion, 12·1. The force required for crushing, 77,573 lbs.—— No. 3, Foundry Pig: The specific gravity was 7·155. In the tensile test the breaking weight was 23,707 lbs.; extension, ·012. In the transverse test the breaking weight was 7795 lbs.; deflection, ·186. In the torsion test the breaking weight was 6894 lbs.; angle of torsion, 13·3. The force required for crushing, 85,694 lbs.

Blaenavon Iron-Works, Monmouthshire.—No. 1 and C. Forge: The specific gravity was 7·161*. In the tensile test the breaking weight was 26,760*; extension, ·011. In the transverse test the breaking weight was 7947* lbs.; deflection, ·182. In the torsion test the breaking weight was 5457* lbs.; angle of torsion, 6·1. The force required for crushing, 105,263 lbs.——No. 1, Cold-blast Iron: The specific gravity was 7·137. In the tensile test the breaking weight was 25,456 lbs.; extension, ·012. In the transverse test the breaking weight was 7493* lbs.; deflection, ·171. In the torsion test the breaking weight was 5034* lbs.; angle of torsion, 9·0. The force required for crushing, 91,897* lbs.——Common Forge: The specific gravity was 7·268. In the tensile test the breaking weight was 28,637* lbs.; extension, ·009. In the transverse test the breaking weight was 7805* lbs.; deflection, ·144. In the torsion test the breaking weight was 5953* lbs.; angle of torsion, 4·4. The force required for crushing, 130·860 lbs.——No. 3, Cold-blast Iron: The specific gravity was 7·158. In the tensile test the breaking weight was 23,903* lbs.; extension, ·011. In the transverse test the breaking weight was 7600* lbs.; deflection, ·191. In the torsion test the breaking weight was 5674* lbs.; angle of torsion, 10·2. The force required for crushing, 87,550* lbs.——Bright: The specific gravity was 7·150. In the tensile test the breaking weight was 23,139* lbs.; extension, ·009. In the transverse test the breaking weight was 6594* lbs.; deflection, ·120. In the torsion test the breaking weight was 3982* lbs.; angle of torsion, 2·9. The force required for crushing, 126,666 lbs.

Pontypool Iron-Works, Monmouthshire.—Cold-blast Iron: The specific gravity was 7·169. In the tensile test the breaking weight was 26,502* lbs.; extension, ·015. In the transverse test the breaking weight was 6669* lbs.; deflection, ·144. In the torsion test the breaking weight was 5245* lbs.; angle of torsion, 5·3. The force required for crushing, 99,618 lbs.

Samples marked thus (*) have one or more defective specimens in the set; thus (†), too hard for turning.

COLLIERY INSPECTION—THE REPORTS.

No. 9. The South Wales District.—During the year 1859 seventy separate accidents occurred in this district, resulting in the death of 131 persons; and as the quantity of coals raised was nearly 7,000,000 tons it appears that about 53,000 tons were raised for each death. Mr. Evans's report is of a purely practical character, yet affords a vast amount of information bearing upon the mode in which collieries in that district are conducted. At the Primrose Colliery, in the Swansea Valley, an engine had recently been erected underground for drawing coal up a slant, and two boilers to supply the same with steam. Fires were lighted some days previously to dry the masonry, and on the day of the accident it was intended to have commenced working the engine. The return air from a district of the colliery, together with the condensed steam and the results of combustion, passed along a heading a very considerable distance—more than 1000 yards—to a shallow shaft. At one point on this heading a small door was fixed to enable the overman and his deputies to examine the windway. Although the deputy whose duty it was to examine this portion of the colliery declares that at six o'clock in the morning all was safe, it was found two hours afterwards that the door had been opened, and the vapours were filling the mine, and men and boys lay senseless from its effects, their candles and lamps still burning. Every possible exertion was made to get at the sufferers, and many were saved, but ten poor fellows lost their lives. The general management of the mine was very lax.

Another accident through negligence on the part of those working the pits occurred at the Cae Colliery, Llanelly, where the owners were hard-working miners, with little or no capital to carry out such an undertaking. One of them, who was with the other nine unfortunate men, employed himself as a collier, the other sold the coal at the shaft top, and attended the engine. The works had been carried on without plans or boreholes, and the consequence was some old workings were cut into, and the pit inundated with water.

At the Morfa Colliery, the property of Messrs. Vivian and Son, and one of the most extensive under Mr. Evans's inspection, the colliery was well ventilated, and the accident seems to have resulted entirely from the recklessness of the colliers—locked safety-lamps were used, but keys were found with some of the deceased, and two nails tied together, no doubt used for opening the lamps, were found in the pocket of another. Mr. Evans remarks that the general arrangement and discipline of the colliery is superior to most others in his district, and expresses the hope that colliers generally will benefit by seeing in such a sad and deplorable loss of life the results of their own imprudence.

No. 10. The Western Division.—In his report upon this district, Mr. Lionel Brough states that deaths from miscellaneous causes were quite as numerous in 1858 as in the preceding year. Most of them arose from the crushing of trams, or from being overpowered by them either in the headings or on underground incline planes. This is a source of accident by far too common in all collieries, and next to abundant sectional area in these subterranean avenues is the obvious necessity of very strict discipline; this latter is almost as much required in mines as it is in the naval and military services themselves.

It is perhaps worthy of note that explosions are more common in boilers belonging to condensing engines, and to those of the high-pressure kind, which range from 20 lbs. to 40 lbs. to the square inch, than to any other class. Whilst, on the contrary, there are comparatively few accidents amongst those that work with a much higher force or tension of steam. The management of these latter is generally confided to superior persons—men of a higher order of intelligence, possessing more skill in their calling, and, of course, realising a corresponding higher rate of wages. The reason of this is found in the prevailing opinion, to some extent a true one, that a very high and concentrated state of steam is attended with danger, and demands greater care and attention, but that with pressures at a lower rate there is but little to be apprehended, and that a less expensive class of engine tender will satisfy the exigencies of the case. Mr. Brough remarks that it is needless to point out the fallacy of the supposition. The number of deaths from accidents in this district was 54, and as the total yield of coal was upwards of 2,000,000 tons, it appears that about one life was lost for each 40,000 tons raised.

No. 11. Scotland.—In Mr. Williams's district the number of deaths from accidents during 1858 was 35, and in Mr. Alexander's, 41=76, and the total quantity of coal raised was 8,926,249 tons, so that about 117,450 tons of coals were raised for each life lost. Mr. Williams states that the facilities for improved education is making steady progress, particularly at

some of the large works, where schools have been built with every necessary accommodation. A movement has also been made for establishing a Mining School in Glasgow of a thoroughly practical description, which, if properly carried out, cannot fail to have a most beneficial effect on the mining operations of Scotland.

Mr. Alexander explains a simple and ingenious contrivance which has of late been introduced for preventing pithead men falling down shafts. It forms a complete fence round the pit mouth when the cage is not at surface, and, being moveable, when the cage is raised to the usual landing it rests upon it. The plan was described by Mr. Atkinson in 1856, but Mr. Alexander gives such sketches as will be sufficient to guide the carpenter or colliery-wright in its construction. He concludes his report with a corroboration of Mr. Williams's statements and opinions with regard to the extension of education in Scotland, and the proposed Mining School in Glasgow.

NEW THEORY OF THE SOLAR SYSTEM.

We are informed by reliable historical writers that the propounders of new theories, which have since been proved correct, relating to the solar system, have been persecuted by those believing in the accuracy of previously existing ones; yet we are willing to bear the reproach of being branded as averse to progress in preference to adopting the theory laid down in the book we have now before us, entitled "The Simplicity of the Creation; or, the Astronomical Monument of the Blessed Virgin;" and written by Mr. Wm. Adolph. The treatise comprises nearly 200 pages of arguments, the principal, if not the sole, object of which appears to be the refutation of every doctrine held by all scientific men upon astronomical subjects. As the uneducated mechanic, from the first simple error of supposing that by the application of mechanical contrivances power may be increased without a corresponding loss of time, builds upon his insecure foundation until he believes himself capable of constructing a machine by which propulsive force may be altogether dispensed with; so Mr. Adolph, by first asserting the non-existence of self-acting forces, and then admitting that by material causes, created with the world, forces which in the ordinary acceptation of the term would be deemed self-acting, were produced and continue in full activity to the present time, has become so inextricably confused in his ideas that there is little hope of convincing him that he is deluded himself, unless he could first be shown that the very bases upon which he argues are wrong. The science of astronomy is, doubtless, the most beautiful with which we are acquainted, and we entertain the opinion that the views enunciated by all the celebrated astronomers of the present day are not so totally erroneous as to render it necessary to seek for an entirely new foundation upon which to work. Had Mr. Adolph attempted to upset the theories which have been adopted by certain self-styled geologists, or to introduce a theory the effect of which should be to settle the disputes with respect to minor details amongst the *elite* of that science, we would have wished him success, but to attempt to prove that astronomy—a science which has been brought to such perfection as to enable Le Verrier to assert the existence of a planet which no human eye had ever seen, and whose distance from the sun cannot be less than 1,800,000,000 miles; and to say, moreover, that at a certain place, upon a stated day, and at a given hour and minute, it would be visible in a certain spot in the heavens, within two degrees of which it was actually discovered by another astronomer, who had only received written instructions from Le Verrier where to look for it—should be attacked at its very foundation by a respectable city merchant, who has spent much more of his time in the study of accounts than of mathematics or astronomy, certainly surpises us. That it should not, however, appear that we discountenance a theory because it is new, regardless of its merits, we shall explain as briefly as possible what we conceive to be some of Mr. Adolph's views, at the same time expressing the hope that those entering upon the study of astronomy will choose rather to rely upon the facts which enabled Le Verrier to perform the wonderful feat above recorded, than build their hopes upon a theory which, in our opinion, and probably in that of all acquainted with astronomy, will, "like the baseless fabric of a vision, leave not a wreck behind."

When God in the beginning, says Mr. Adolph, had created heaven and earth, substances visible and invisible, ponderable and imponderable, electricity in its twofold nature, as the binding and repelling agent of creation, and with its first quivering and quickening motion chaos began to tremble, to sunder, and matter to conglomerate according to His design. Silently, and as it were unconsciously, negative electricity principally allied itself to matter in order to form ponderable bodies, which at the same time it repelled from each other like so many drops of water falling from the clouds; positive electricity expanded the more chiefly to keep company with imponderable substances, and to embrace the nascent systems and constellations, until magnetic worlds—inclosing within their womb the kernel, the germ of their own foundation, the *fiat* of the Eternal Word—were moulded into shape, the Spirit of God moving over the dark, formless, and silent deep. But now Mr. Adolph has to account for the first production of light; and here he reminds us of the elder Charles Matthews, who to reconcile the assertions—firstly, that he had but one arrow; and secondly, that he had killed 150 men, declared that he had a string to it, and "shot a man and pulled it back" as often as necessary. The electricity was brought back in the same way, and thus the negative and positive currents first met, and the electric sparks being the result, the command "Let there be light!" was complied with. On the second day, by separating for good the contending yet to union-inclining electric elements, God created the firmament, the non-conducting atmosphere of the earth, and probably also the atmospheres of the other planets, suns, and stars of the universe. In the separation of the dry land from the water, the positive electricity retired still further from the solid body of our globe, whilst the negative became more strictly confined within the ponderable spheres with which it had associated, and with this closer confinement the heat of the exterior crust of the earth gradually decreased in proportion, whilst interior heat and activity augmented. Positive electricity continuing to recede from the centre, and to concentrate as it receded, then, "at the highest and purest pitch of concentration, the electric envelopes of the suns broke through the charm that had bound them in slumbering action, they burst into fire, and from simple heavenly bodies became lights and stars to shine and sparkle in the expanse of the heavens, and to behold and hold fast the interior bodies that had nestled within their invisible bosoms."

He considers the theory, usually accepted as correct, concerning the rotation of the earth round her axis, must strike every one as arbitrary, forced, unnatural, and untenable; whilst his own propositions could not be more simple and reasonable. He maintains that the planets revolve with their axes parallel to that of the sun; but here, again, he has to get over the difficulty of losing the seasons. Happily he is enabled to bring his electricity into play, for (says he) the earth has two magnetic poles, and a magnetic or electric centre. "The same as the centre (the heart) of the earth is acted upon by the sun so are the poles, and this in such manner that the balance of the spiral circulation of the electric fluid in the earth inclining by degrees for six months towards the north, the sun will attract the north pole and repel the south; and inclining for the other six months to the south, he will attract the south and repel the north pole, or, which is the same, the balance of circulation will cause the poles to rise and fall in turn, held as it were by the beam of the sun." In referring to his theory of the tides, he gives in his adhesion to the fallacious theory of the non-rotation of the moon. He says "the theory that the moon rotates round an axis of her own is a totally false assumption, based upon the idea that a body moving in a circle, and the body forming the centre of a sphere, or a circle, and moving on its pivot, is one and the same thing. If this be true, the controversy must be at an end. It is only to be regretted that in so simple a matter so many words should have been, and have to be, wasted." So say we; and if the controversy can be ended so easily as Mr. Adolph states, we would suggest the following:—Let two wheels be fixed upon a square axle in such a manner that the one cannot rotate without the other; let the axle be provided with two joints, turning in an opposite direction, so that when bent the axle may assume a form nearly like the letter Z, and as much space as possible left between the joints. The fact that one wheel cannot rotate without the other can then be demonstrated whilst the axle is straight, and by fixing one end of the axle as a pivot, bending the axle, and then causing the one wheel to revolve about the other, it may be made equally apparent that the rotation of the revolving wheel is identical with the rotation of that which is stationary, which will satisfy Mr. Adolph's problem.

At a meeting in Paris, the other day, of the shareholders of the proposed Italian railway by the Simplon, it was stated that upon the completion of the proposed tunnel under the Simplon the Alps, that formerly took 12 hours to pass, will be passed over in half an hour. In that short time the traveller will pass from the valley of the Rhone to the valley d'Ossola, and the Lake of Geneva will be only four hours from the Lago Maggiore.

AUSTRALIA.—The clipper *Blue Jacket*, belonging to Messrs. Wilson and Chambers, White Star Line of Australian Packets, arrived at Liverpool on Thursday from Melbourne, in 79 days, the fastest passage of the season. She brings 86 passengers, of whom seven were in the saloon, 3600 ozs. of gold, 11,000 sovereigns, and a large assorted cargo. The *Blue Jacket* also brings the New Zealand mails, which were too late for the June steamer at Melbourne.

THE WESTPHALIAN COAL FIELDS.

SIZE, IMPORTANCE, AND GEOLOGICAL CHARACTER—ITS MINES, MINERS, AND CAPITALISTS.

The Rhine traveller finds few things more suggestive of the existence of an active business population upon the borders of that noble river than the numerous trains of small but deeply-laden vessels which he meets every hour of his passage between Cologne and Strasbourg. In the daytime their appearance is anything but picturesque, but seen at night, from the Drachinfels and Rheineck, the sturdy steamer climbing slowly against the rapid current, with the long line of shadowy ships crawling after, each with a brilliant red lantern hanging from the masthead, they form an element in the landscape which one does not wish absent.

These useful river trains, which closer inspection prove to be laden with coal, grow more numerous below Cologne, and at length we can trace them to their origin at a little town on the right shore, fourteen miles northward from Dusseldorf. The name of the town is Rhurort. It is, in fact, the Newcastle of the Rhine, and is, to a rich and productive coal field, running eastward on both sides of the navigable Rhine, what Schuylkill Haven is to the basins about Pottsville. That the coal basin of the Rhine, or the Westphalian coal field, is but a continuation of the carboniferous formation which appears in Belgium and in England, is the view of many geologists. They found their deductions upon a similarity of fossil remains, and a parallelism of stratification, and conclude that this streak of coal-bearing rocks was in some former age deposited upon the shore of a vast ocean, which swept over much of the surface now occupied by Western Europe.

The Westphalian basin, however, is not known by direct tracing of the strata to be connected with any other. It exists geographically isolated from the other coal fields, and it forms a political unit in the Prussian possessions on the Rhine. It stretches on both sides of the river Rhur from near the town of Unna eastward to the Rhine, and includes in its productive portion a small district on the left bank of that river. It is naturally divided into two parts or belts; a southern, where the coal measures proper come to the surface, and a northern, where these measures run under an evenly deposited and gradually thickening bed of "marl" belonging to the chalk series. The former of these divisions is about five miles (English) in breadth, and thirty-eight miles long, with a surface of at least 168 square miles. The extent of that portion of the field covered by younger formations is impossible to be accurately ascertained, since towards the north the coal slates pass under the heavy beds of marl, and although the surface has been pierced by hundreds of experimental boreholes for miles beyond the present productive limit, fossil fuel still continues to be found.

Upon the left bank of the Rhine is a region which is not fully known, existing as it does entirely beneath marl beds several hundred feet thick. It appears, however, to end at Kreield, where at the depth of 587 ft. older formations were found, but where even after boring 1115 feet no coal was obtained. The Rhine flows across the coal field, but at the distance of 500 feet above it.

The present boundaries of the known field may be considered to include 230 square miles on the right, and 21 square miles on the left side of the Rhine.

The strike of the veins and of the various axes is north-east and south-west, being coincident with the older strata which border the formation. The field is divided into several anticlinal axes or minor basins, which are of the greatest importance to the operator, since they determine the depth, pitch, and, to a certain extent, the quality of the coal he may desire to raise. It is found that, as a general rule, the higher seams are the most bituminous, or fattest, and that as the lower beds are penetrated a harder coal is produced. In the western part of the basin, in a perpendicular depth of 5746 feet, are found not less than 83 seams, 58 of which are worthy of being worked, having an aggregate thickness of 155 ft. of coal. The remaining 25 carry an aggregate of 18 feet of coal, and are too small for profitable extraction. Of this 155 ft. of workable coal, 90 ft. are fat coal, 26 ft. sinter coal, and 39 ft. sand or meagre coal.

The amount of coal contained in the Westphalian basin, reckoned after this and various other measurements, is as follows:—

Fat and sinter coal .....Tons 22,500,000,000
Meagre, or sand coal ..... „ 12,500,000,000=35,000,000,000 tons.

Of this mass, that which exists 666 feet below the surface, includes 12,500,000,000 tons, and that which is in the second 666 ft. 8,000,000,000 tons, and so on, decreasing as the lower portions of the basin is entered.

In 1846 a calculation was made, founded upon the data then known, and 11,100,000,000 tons of coal were shown to be embedded in the basin, or about one-third of the present amount. Indeed, it is not too much to say, that through experimental borings which were instituted because geologists said coal must exist under the chalk marl, 20,000,000,000 of tons of coal have been discovered in the Westphalian basin alone. Or in other words, estimating the coal to be worth the price usually paid for it in the ground, the science of geology had added to the wealth of Rhenish Prussia as many dollars as would pay all the expenses of the United States General Government, even at its present increased figure, for a period of 20 years.

Most of these borings were made in chalk, and nearly all were at a greater or less depth successful in finding valuable seams, but some wealthy peasants who live on the Devonian formation in the neighbourhood of Ellerfeld, disregarding the advice of their geological friends, sank several deep and expensive holes in the older rocks, but at last gave up their search, finding nothing blacker than disappointment, and nothing more combustible than flint and firestone.

In 1855 the business of boring was carried on most vigorously, and in that year it was calculated that not fewer than 1500 persons were engaged in it in the province of Arnsberg alone. To any party who obtains coal, and declares his intention to work it, Government is always ready to grant the privilege, provided the permission has not already been given to an earlier applicant. A number of amusing stories are told of parties who commenced boring in the immediate vicinity of each other, and thus drove their augers down with all the rapidity that steam and constant attention could produce, knowing that whoever could show that he had reached coal first would obtain the right to all the neighbouring surface. At Meiderick an English and a German company, who were near each other, run close race for more than a month, day and night, and Sundays; at length, one day, the German found coal, while the Englishman was still hammering away at the top of his speed in the dead rock. A few hours afterwards the Englishman struck the same seam. Expecting this result, he had kept his horse ready geared at the engine-house door, and the moment he saw the black powder from below he galloped to the mining office, and succeeded getting a legal witness on the ground before his more plodding neighbour, who had gone for his officer across the fields, could return.

All the experimental borings, however, are not made by private enterprise. The Prussian Government lends its aid wherever there are many difficulties in the way, and where the discovery of useful minerals would largely benefit a whole community. Other German Governments are not behindhand in these important searches. Wurtemberg had, in January, 1858, a borehole 1267 feet deep in the new red sandstone, and the Government of Saxe Weimar has driven an opening into the same formation 2054 feet. In neither case, as yet, have they reached coal. The second deepest boring in the world is sunk for salt at New Salz Werk, in Westphalia; it is 2220 feet deep.

Of the coal produced by the Westphalian mines a vast quantity is used by the domestic iron-works; 1,250,000 tons, however, are exported by the Rhine from Rhurort; 6,500,000 tons are distributed along the river by tug-boats, as far up as Strasburg, while 500,000 tons are taken by sail ships to Holland. Several railways are in course of construction, one of which will penetrate the rich metalliferous districts of Siegen and Nassau, and thus open a new market for fuel.

An idea of the scale on which mining operations are established and carried on can be obtained from the following table:—

Name of Mine.	Depth in feet.	No. of seams.	Thickness of seams in inches.	No. of Labourers.	Tons per year.
Fiedrich Wilhelm	400	8	18 to 40	478	86,420
Gluckauf Siegen	480	6	18 to 50	311	34,900
Gluckauf	754	3	42 to 47	323	54,400
Schnurbank	620	2	36 to 55	364	41,720
Bickefeld	330	34*	22 to 46	338	29,700
Franziska	533	3	30 to 56	189	47,328
Johan Freederich..(Adit)	6660	4	28 to 70	246	23,000
President	540	7	18 to 98	484	70,000
Maria Anna .....(Adit)	13320	8	22 to 40	589	65,500

* But four of these are worked.

The above-mentioned mines, beside being the largest producing establishments in Westphalia, are among the deepest in that country. Compared with those of other European basins the shafts are comparatively shallow. Indeed, in America, we have at the Midlothian Works a pit within a few fathoms of the depth of the deepest mine in Westphalia—the Gluckauf. The deepest coal pit in Great Britain is said to be Pemberton's, at Monkwearmouth, which reaches 1680 feet below day. I have already mentioned the Sebastopol shaft, near Charleroi, which is 1791 feet deep. But the depth of a mine is not a measure of the size of the operation. The Gewalt Mine, on the left bank of the Rhur, is but 490 ft. deep, and yet has seven stages or levels of working.

A student of the landscape would divide Westphalia into two sections, that are indistinctly separated from each other by the line between the coal measures and the chalk. The true coal slates coming out along the Rhur have been bent by the action of internal forces, as the formations upon the upper Schuylkill, but they present little or none of the boldness of contour which characterises that region. Neither does one find here the deep, sharp valleys, cut by the long action of the streams, which are seen in Western Pennsylvania. The country along the Rhur may be said to be rolling; many small valleys running off to the north and south. The surface of marl forms many flowing ridges and valleys, which at first sight would be supposed to point out the different axes of the coal, which lie in numerous waves beneath, but this is found not to be the case. No relation can be discovered to exist between the surface valleys and the strike and pitch of the seams below.

A very excellent map of the region has recently been published, to the scale of 1-51200 (reduced from the map in the mining office, which is 1-1600) upon which all the formations, and all the chief anticlinal (saddles) and synclinal axes (basins) are given, the history of which, as told me by Dr. B., of Essen, is somewhat singular.

Previous to the Paris Exposition of All Nations, the "people" knew nothing of the general arrangement of the Westphalian seams. The strata are so complicated that it is impossible to trace the connection between one mine and another, without having a large number of accurate data at hand. These data were only possessed by the Government Mining Office, and hence no one who was not connected with that office could give reliable information regarding the strike and dip of the seams in new parts of the field. A large, accurate, and beautifully coloured map was made and sent to the Exhibition, the officers innocently supposing that it would only serve as a specimen of excellent workmanship, and as means of displaying the wealth of Westphalia to French capitalists and stockholders. But the French not only admired but took tracings of the drawing, and soon a fine *fac simile* appeared from the Parisian press. This, of course, made the necessity for a German map evident, and one appeared a short time ago, accompanied by a book of explanations.

A large number of the Westphalian mines are owned by joint-stock companies, the head quarters of which are at Cologne. This city is, indeed, the monetary capitol of the field. Several companies from Great Britain have recently established themselves here, as the names "Shamrock" and "Hibernia" testify. Beside these, at least two new shafts are in process of sinking, with men and capital from across the Channel. The capitalists of Westphalia are comparatively numerous, and in many instances bold. Some of the heaviest are self-made men. Hunniel, of Rhurort—whom I heard make a speech at a dinner in Bonn, in which he said, as he supported his tottering form by the back of his chair, that he had no greater wish than that he could live 25 years longer, to see the progress of science which had so wonderfully developed during his lifetime—has built his fortune by enterprising operations in iron manufactures and coal, until now he is said to have an income bordering on $500,000 per year. And Krupp, of Essen, who now has 1400 men employed in his cast-steel works, and who is building a single steam-hammer which will cost, I learn from good authority, not less than $150,000, took his sleep for weeks on the ashes by the side of his furnace fire, too busy, and too much absorbed in the result of his experiments, to go to bed.

In my next I will speak of some of the attempts being made to sink shafts through the quicksands of the Rhine, where novel difficulties are encountered at every step, and where some remarkable machinery is in use.

United States Railway and Mining Register. R. H. L.

SALE OF MINERAL PROPERTY AND LAND IN AMERICA.—At the present time there is in the market an extensive landed estate, situate in the state of New York, a great portion of which is situate but a short remove from that city. This portion consists of about 40,000 acres of freehold land, within a short distance of the Saratoga Springs, is intersected by the Erie Canal, and accessible by rail from New York. It is interspersed with numerous lakes, the outlets of which furnish inexhaustible water-power for mills of the largest size. The land is chiefly covered with timber, and is very fertile in its character. There are already several mills and tanneries, &c., erected in the county, which are in successful operation; and the land in question is well adapted for undertakings of a similar character. Coal and ironstone in large quantities underlie the property, and the facilities for water transit for all kinds of commodities offer inducements for the extensive working of the mineral deposits of the country. Another portion of the estate is situated near the Falls of Niagara, and provided with every facility for the carrying on of a lumbering business. The Watertown and Potsdam Railway, the Albany Canal, and Cape Vincent Railway, afford excellent means of transit for timber, while access to Chicago, the largest lumber market in the States, is obtained easily by lake navigation. The sawing timber produced, consisting of pine, spruce, hemlock, ash, maple, &c., averages 20,000 feet to the acre, and the bark is found valuable for tanning purposes. Extensive deposits of iron ore are found on the estate. The remaining portion of the estate is situated about 50 miles from New York, with which city there is a direct communication by rail, and affords advantages for building purposes, and for the cultivation of agricultural produce. There is also in the market a tract of freehold land, situate in the state of Georgia. It comprises 1,360,000 acres of territory, almost wholly covered with forests of pine timber, and forms part of the celebrated Yellow Pine Belt of Southern Georgia, notorious for the large growth and great strength of the trees. This timber is preferred by shipowners to any other species. The quantity of yeltow pine shipped from the ports of Georgia during the last five years is estimated at 500,000,000 ft., cut from that state alone, or equivalent to the clearance of 350,000 acres. The property in question, it appears, embraces almost the only uncutled pine forest now existing in the Atlantic waters that is conveniently situated for river carriage. The principal products of the cultivated lands in Georgia are Sea Island cotton, maize, oats, sugar, rice, &c.

THE ENGLISH IN BRAZIL.—ST. JOHN DEL REY MINING COMPANY MORRO VELHO.—Our readers may, perhaps, remember that about two years ago, an account of a festive day in connection with the Sunday Schools at the above establishment, was inserted in our columns. It is with pleasure that we are again enabled to lay before all interested in that extensive mining concern, and in these engaged in it a similar account of festivities held there on June 24 last. At 9 o'clock A M., all hands assembled on the Campo to join in or be spectators of games, races, and other athletic exercises. These amusements were carried on with good feeling and much spirit until nearly 2 o'clock. At about 11 o'clock, the superintendent, Mr. Gordon, and his family, came on the ground, and was greeted with some hearty cheers. At 2 o'clock the scholars of the three Sunday Schools assembled at the parsonage. Twelve young men, all engaged in the various departments of the company's works, 25 boys and 24 girls, making a total of 61 young people, with the chaplain, teachers, and band, formed in procession, and walked round the Campo to the shore, a large room of which had been most tastefully decorated and laid out for about 200 guests. All this was arranged by the voluntary labour of the members, male and female, of the establishment. The refreshments consisted of cold roast and boiled beef, with tea, and abundance of cake and bread. From 3 o'clock to 5 these provisions were partaken of by the children and general company, and at that hour all rose, and the tables were cleared for the evening's entertainment, announced to commence at six o'clock. Punctuality at that hour the superintendent took his seat, supported by the chaplain, and Capt. Treloar, with the other officers and their wives. Mr. Gordon then addressed some very appropriate and encouraging remarks to the parents and children, indeed to all assembled. After this, for about three hours the whole assembly were kept interested and amused by addresses, songs and hyms, recitations and poetry, and tunes from the band, and during this time also a book was given to each of the scholars as a reward for regularity of attendance and good conduct at the Sunday School. At about 9·30 all dispersed quietly, well satisfied with their day's enjoyment. When it is considered that this thoroughly English and homely scene took place in the interior of Brazil—that the expense is met by voluntary contributions—that throughout the day neither on the Campo or the shore was there anything more exhilarating than tea served—that scarcely six members, and these chiefly on necessary duty, were absent on this occasion, it speaks volumes for the credit of those composing this very extensive and now long-standing establishment. And it may not be unimportant to notice that something of its enduring success may be fairly attributed to the care which, much to their credit, the directors have shown to supply their servants and their families, so far removed from home associations, with that most important element of stability, so often entirely overlooked in large commercial undertakings—the religious and secular instruction of all employed, secured to them by the building of church, parsonage, and schools, and appointment of a chaplain to discharge the duties connected therewith.—*W. Briton.*

SELF-ACTING MACHINERY.—Mr. W. H. Crispin, of Marsh Gate-lane, Stratford, provisionally specified an invention which relates to certain improved modes of obtaining power, and of applying the same to various purposes in ships and steam-vessels. The elemental power is obtained by the oscillation of a pendulum, the vibration whereof is caused by the motion of the ship, suitable combinations of machinery being actuated by the pendulum when in oscillation. The motive-power thus obtained may be applied in any suitable manner. The invention may be used for obtaining auxiliary power to assist the ordinary steam-engines, for working ships' pumps, for signal apparatus, for the purposes of ventilation, for hoisting, and for a variety of other purposes for which power is needed.

RAILWAY BREAKS.—Some experiments have been made on the Oxford, Worcester, and Wolverhampton Railway to test the efficiency of a new break, the invention of M. Gasse. On Monday a train started from Worcester at half past 3 p.m., and consisted of six carriages, with an engine and tender. The passenger carriages were laden with about two tons of pig-iron each, the whole train, without the engine, weighing about 54 tons. M. Gasse's break was used on two of the carriages near the front of the train, and Newall's break on two of the hinder portion of it. At the first trial of M. Gasse's break, a speed of 45 miles an hour having been attained, the break was applied, and the train stopped in one minute, having run 660 yards upon a practical level. On trial No. 2, upon an incline of 1 in 141 down, the train was stopped in 75 seconds in a little over half a mile. On the third trial of Gasse's break, on an incline of 1 in 197 down, in the same time. Newall's break was then tried on an incline of 1 in 289 down, and 1 in 341 up, a practical level, and was stopped in 65 seconds, with a speed of 41 miles an hour. On No. 2 trial, at 38 miles an hour, on a down incline of 1 in 314, the train was stopped in 55 seconds. On a third trial on an up gradient of 1 in 235, the train was stopped in 60 seconds.

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Correspondence on subjects treated of in the *Register* will be gladly received and given space. 147

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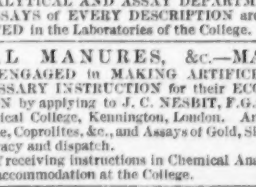

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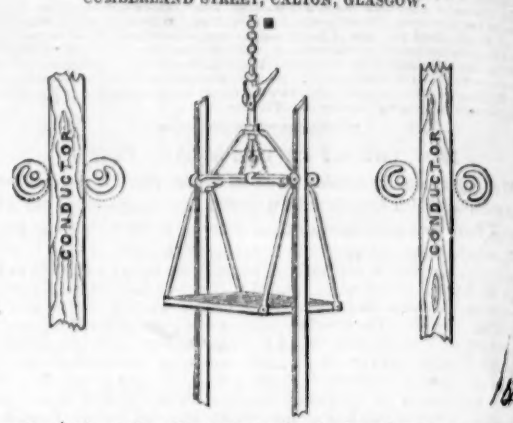

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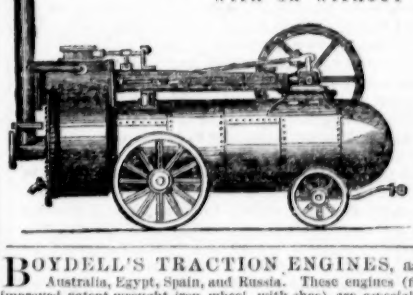

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